



# Adolescent Brain Cognitive Development<sup>®</sup>

*Teen Brains. Today's Science. Brighter Future.*

ABCD Update for Federal Partner Leadership

May 10, 2023

# NIDA – ABCD Team

## New NIDA Staff



**Elizabeth A. Hoffman, Ph.D.**



**Kimberly LeBlanc, Ph.D.**



**Diana Alkire, Ph.D.**



**LCDR Traci M. Murray,  
Ph.D., M.P.H., RN, CPH**



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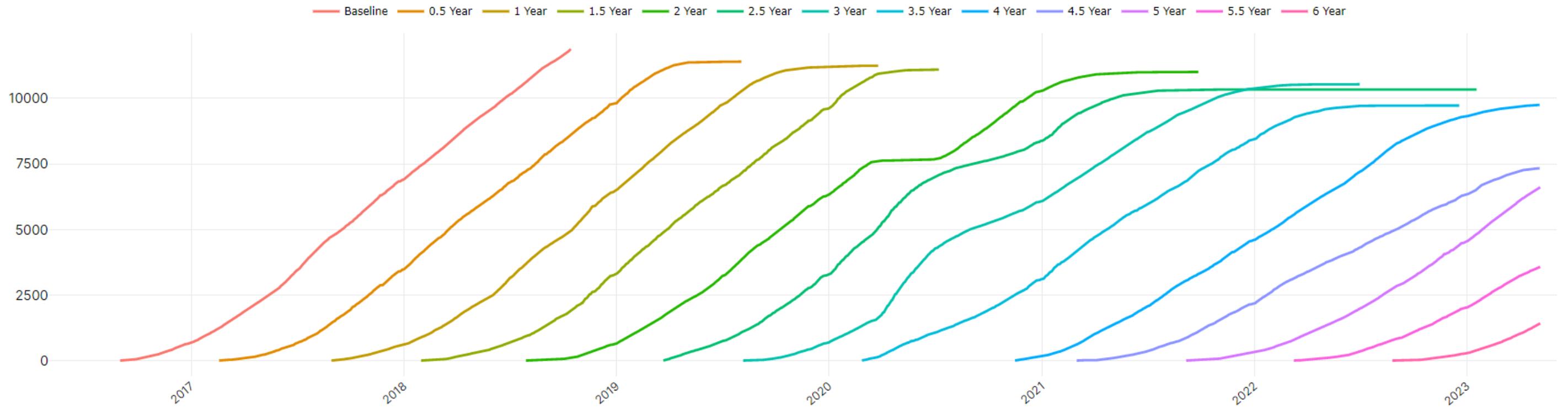
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## Agenda

- Retention Priorities/Strategies
- Data and Biospecimen Sharing
- ABCD Study Outcomes
  - Scientific highlights (LeBlanc)
    - Adverse Childhood Experiences and Sipping Alcohol in U.S. Children: Findings from the Adolescent Brain Cognitive Development Study
    - Characterizing Alcohol Expectancies in the ABCD Study: Associations with Sociodemographic Factors, the Immediate Social Environment, and Genetic Propensities
- ABCD JEDI Initiative (Murray)
  - Scientific highlight (Hoffman)
    - Racial Disparities in Adversity During Childhood and the False Appearance of Race-Related Differences in Brain Structure.
- Research Dissemination
  - Scientific highlights
    - Antipoverty programs may help reduce disparities in brain development and mental health symptoms in children
    - Screentime infographic and webinar

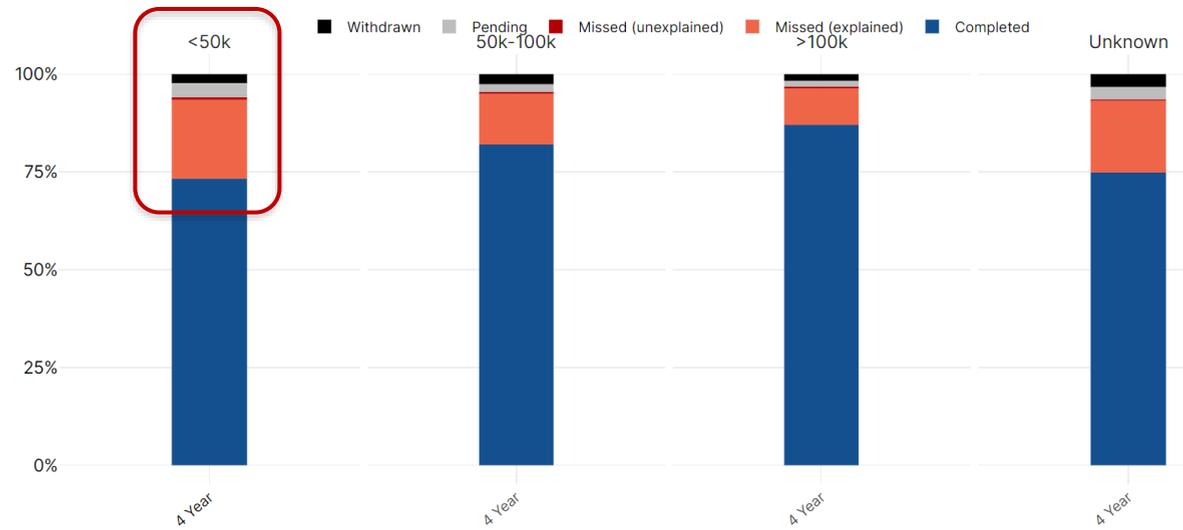
# Visit Completion

97.1% Retained



# Areas of Focus

## Low-income Families



## Potential Withdrawals

N=715

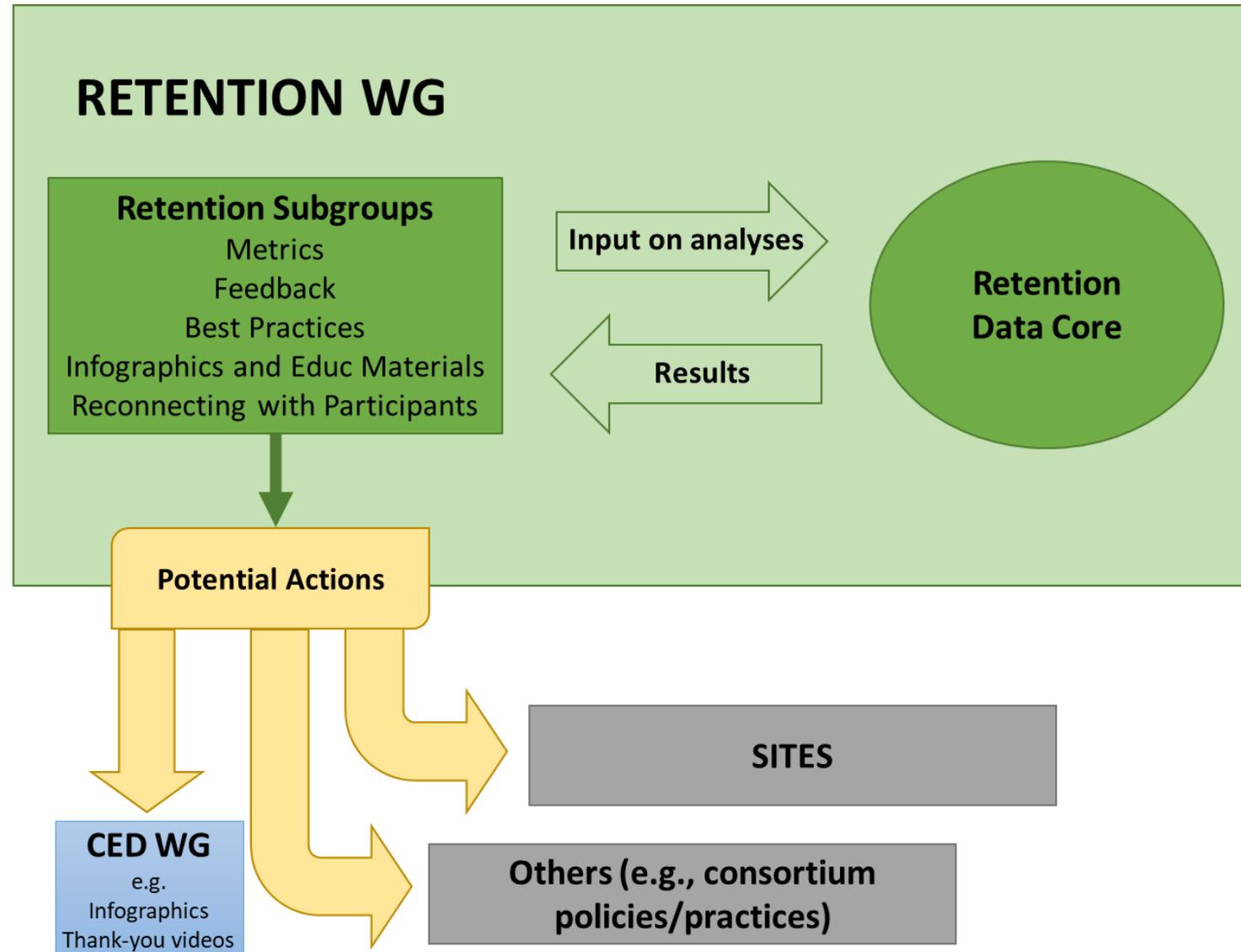
	events						count	freq
	Y1	Y2	Y3	Y4	Y5	Y6		
<input type="checkbox"/>								
<input checked="" type="checkbox"/>	●	●	●	●	●	●	26	0.23%
<input checked="" type="checkbox"/>	●	●	●	●	●	●	79	0.68%
<input checked="" type="checkbox"/>	●	●	●	●	●	●	91	0.79%
<input checked="" type="checkbox"/>	●	●	●	●	●	●	25	0.22%
<input checked="" type="checkbox"/>	●	●	●	●	●	●	118	1.02%
<input checked="" type="checkbox"/>	●	●	●	●	●	●	53	0.46%
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<input checked="" type="checkbox"/>	●	●	●	●	●	●	11	0.10%
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<input checked="" type="checkbox"/>	●	●	●	●	●	●	90	0.78%
<input checked="" type="checkbox"/>	●	●	●	●	●	●	2	0.02%

## Remote Visits





# Data-Driven Retention



- **Analyses**
  - Relationship between feedback and reasons for withdrawals/misses among demographic groups
  - Correlation of best practices with retention metrics
  - Predictive modeling, including behavioral, survey and demographic data
- **Strategies**
  - Compensation models
  - Staffing models
  - Engagement
    - Targeted outreach to ‘potential withdrawals’
    - Tik Tok style Thank you videos
    - Educational materials for families
    - Resources for youth



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- Research Dissemination



# 5.0 Data Release through NDA



- ABCD data access information will be on a central location on the [NDA ABCD Collection page](#)
- Neuroimaging and other file-based data will be accessible via the NDA download tool
- Tabulated data will be in zip files (imaging; non-imaging)
- Unlike in past releases, it will not be possible to filter data by data structure
- DEAP will not be included in 5.0
- ABCD will host a data dictionary explorer application separate from NDA

	Data Release 4.0	Data Release 5.0
Tabulated data in NDA database	✓	
Tabulated data on NDA Supporting Documentation page		✓
File-based data available through NDA download manager	✓	✓
Data dictionary explorer application		✓
DEAP	✓	

## Subsequent Data Releases

ABCD Study® Data Sharing Platform Concept was cleared by NACDA in February 2023

# ABCD Biospecimens

Biospecimen	Collection Frequency	Analyses	Storage location
Hair sample	Annually	Subset - Drug screening @psychemedics	Sites (for now)
Saliva	Annually	Pubertal hormones @ Salimetrics	ACTRI
Teeth	Baseline/as shed		ACTRI
DNA Saliva	Baseline/if blood refused and recollection needed	DNA extraction, genotyping, sequencing	Sampled
Whole Blood	Twins at baseline, every other year starting at 2-year follow up unless missed/refused	DNA, CBC w/differential, HbA1C	Sampled
Serum	every other year starting at 2-year follow up unless missed/refused	Total cholesterol, HDL cholesterol, ferritin	Sampled

**ABCD Biorepositories managed by NIDA**







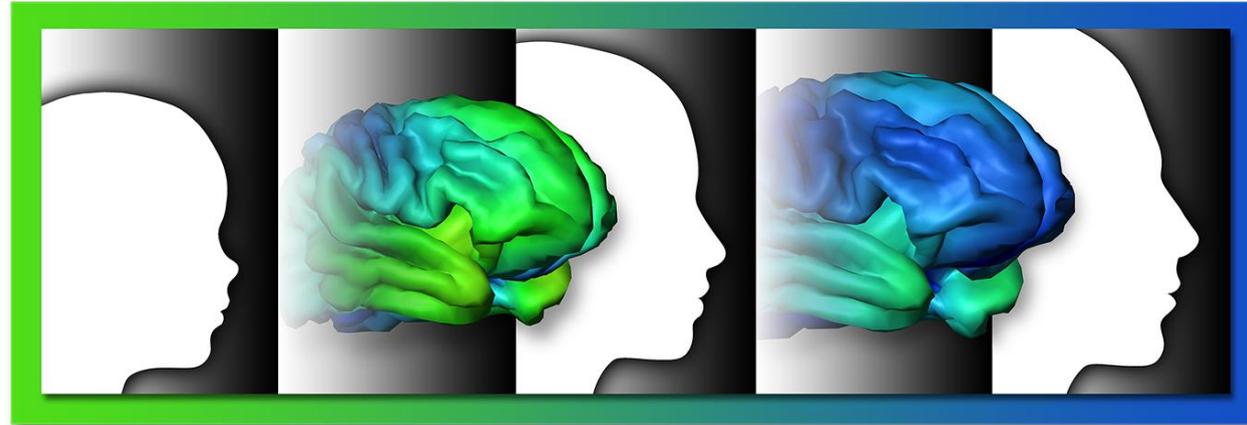
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ABCD Research  
Questions

Methodology/Tools  
Development

Additional Research  
Questions

Pooling Data with  
Other Datasets

Mechanistic Studies

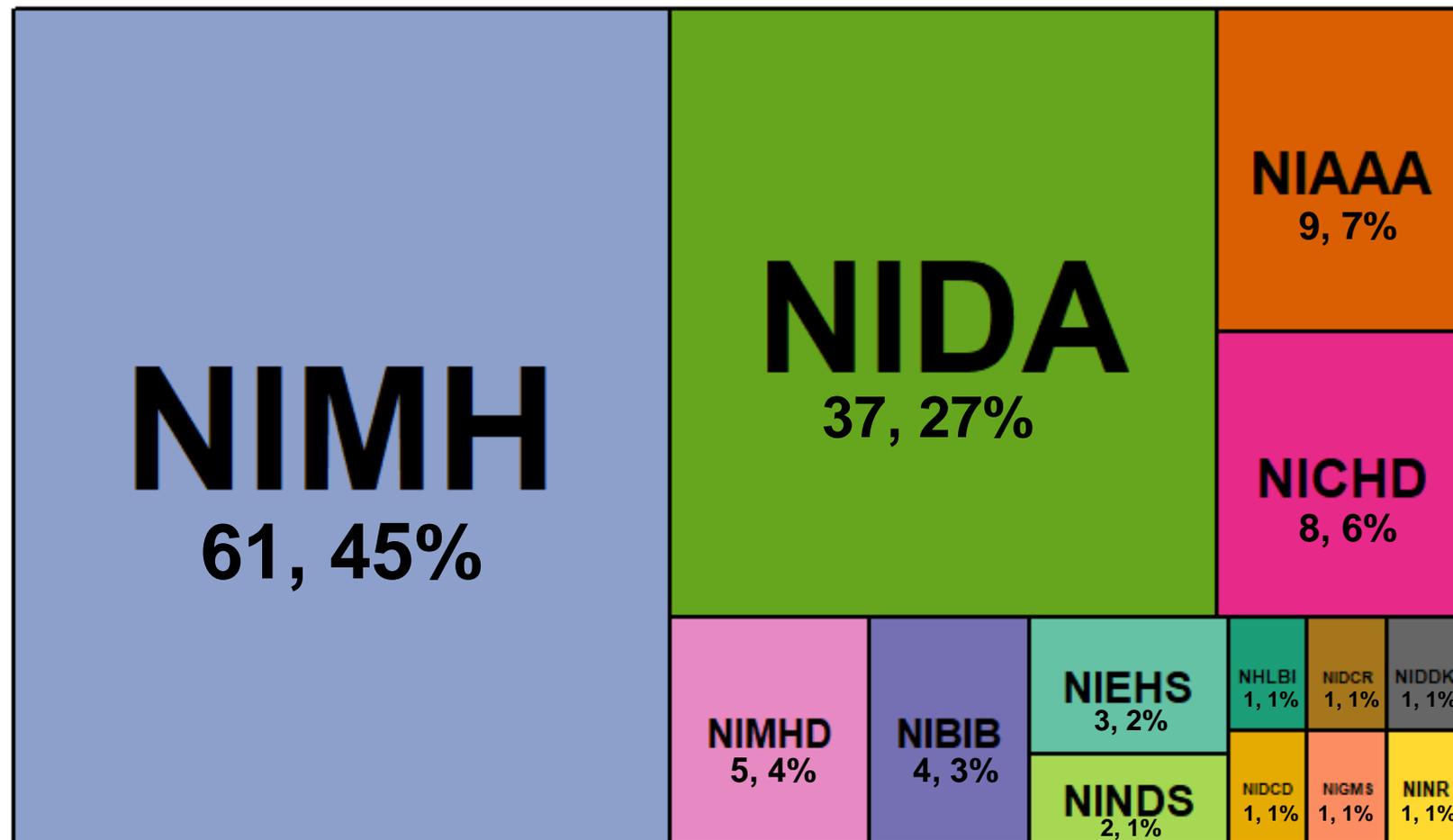
Diagnostic/  
Intervention  
Development

Policies/Practices



# Funded Grants Using ABCD Data or Methods

NIH-funded Grants by IC (n=135, 88%)

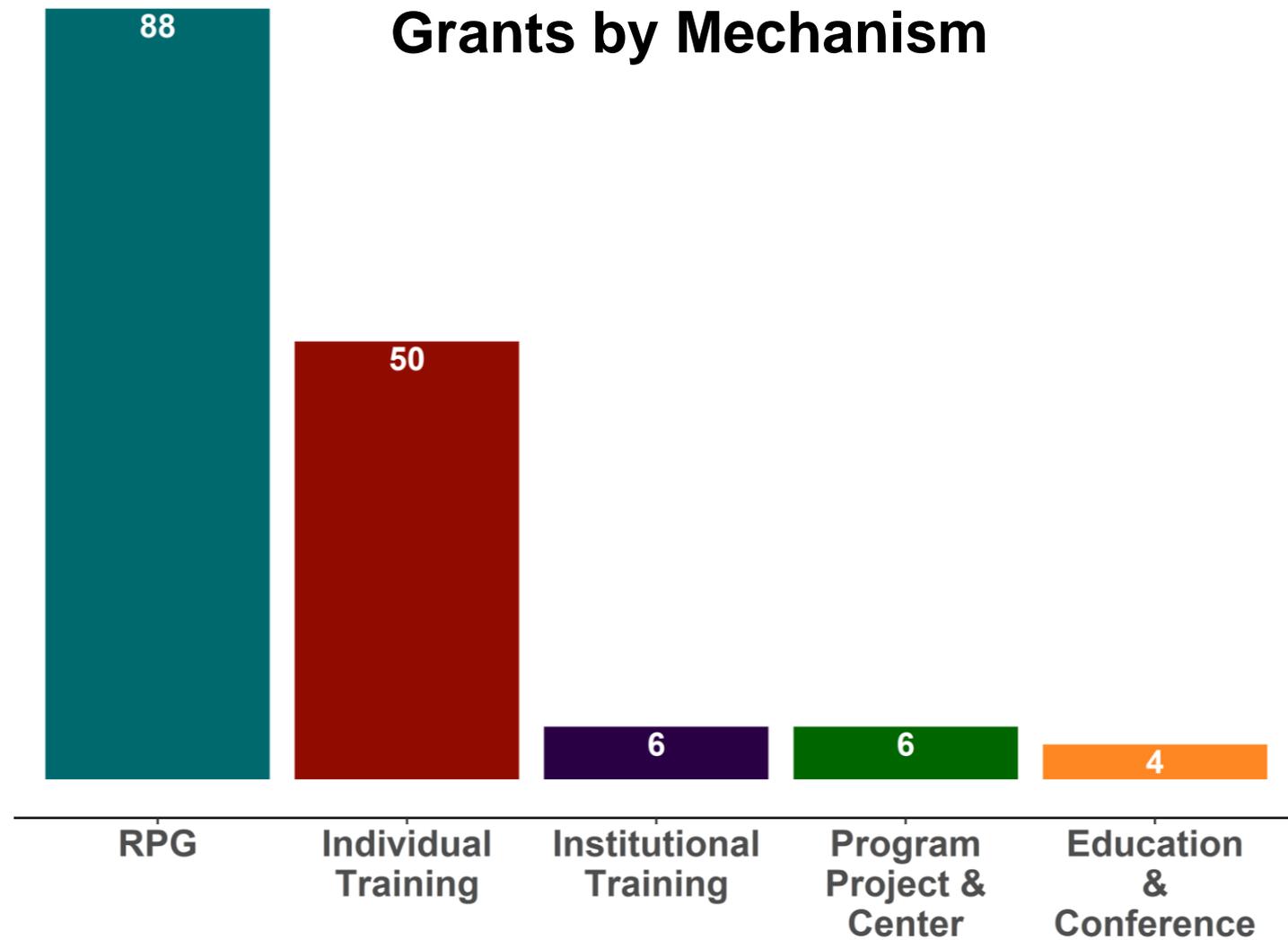


Non-NIH Funders (n=19, 12%)

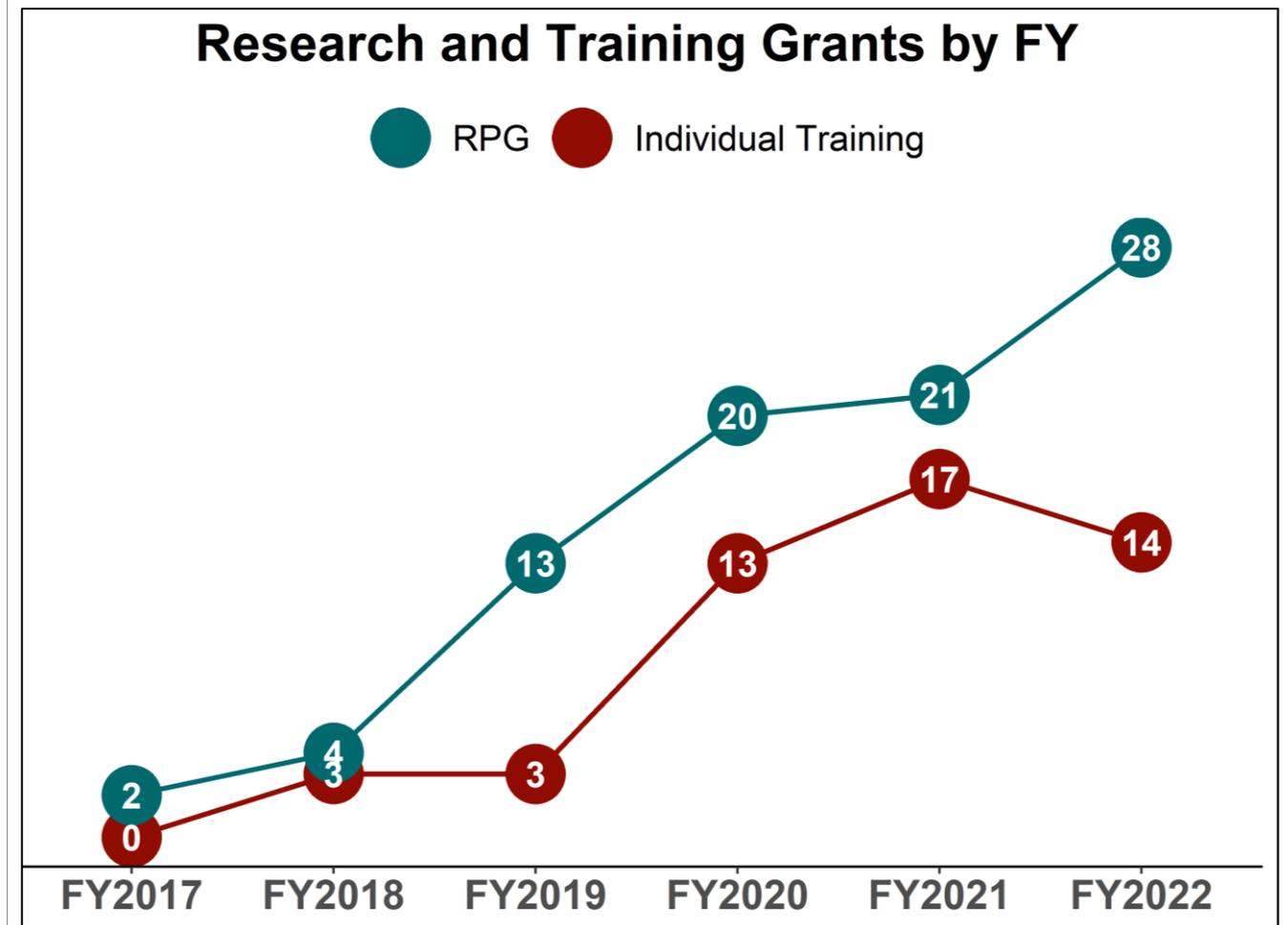
- Brain & Behavior Research Foundation (9)
- National Science Foundation (6)
- National Institute of Justice (1)
- Institute of Education Sciences (1)
- Children and Screens: Institute of Digital Media and Child Development (1)
- Netherlands Organisation for Scientific Research (1)

# Funded Grants Using ABCD Data or Methods

## Grants by Mechanism



## Research and Training Grants by FY

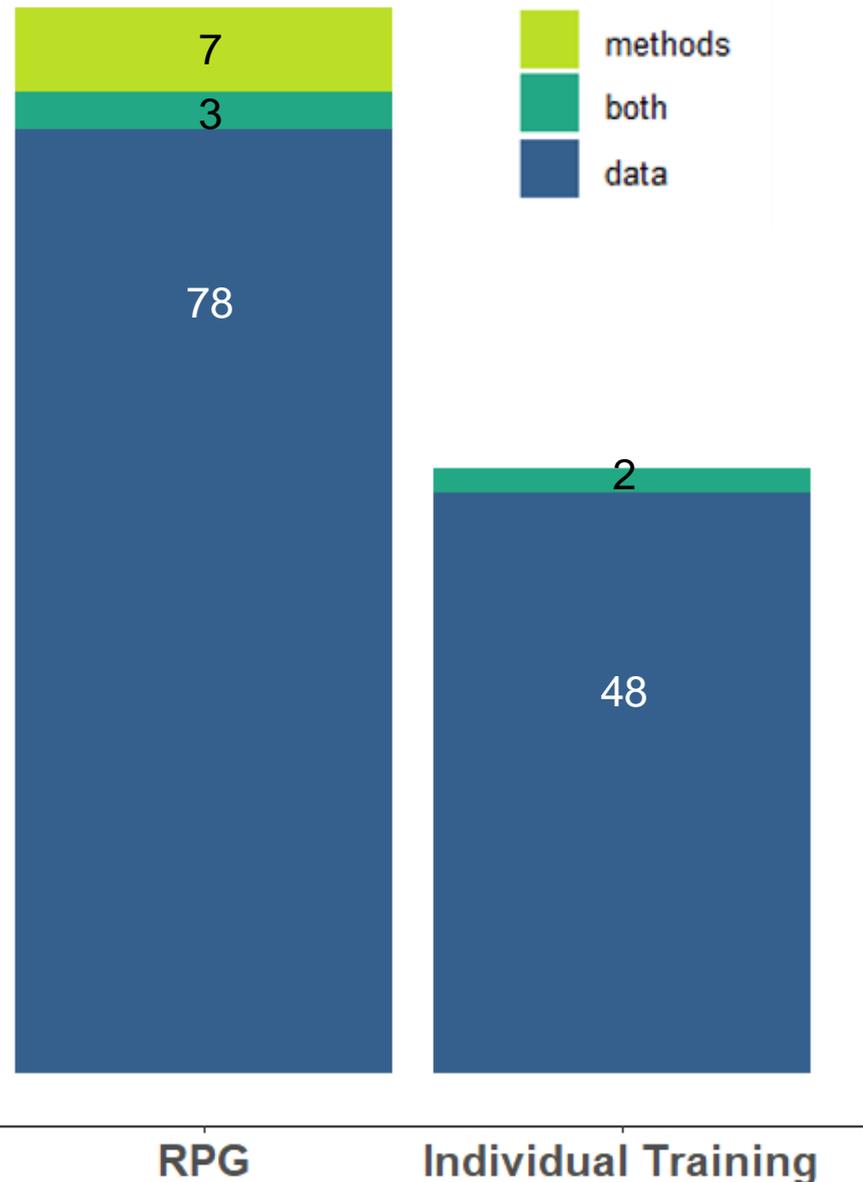


N=154



# Funded Grants Using ABCD Data or Methods

## Using Data, Methods, or Both



## Examples of Sub-categories of Using Data

### Developing/validating methods

- [R01EB022573-05](#) - Personalized Functional Network Modeling to Characterize and Predict Psychopathology in Youth

### ABCD as comparison group

- [R01MH128814-01A1](#) - Autism Spectrum Disorder
- [R01MH118217-01A1](#) - Tourette Syndrome
- [P01HD103133-01](#) – HIV
- [K23NS116225-01A1](#) – Multiple Sclerosis

### ABCD as replication sample

- [R01MH129493-01](#) Characterizing pubertal and age mechanisms of neurodevelopment and association with rising internalizing symptoms

### Pooling datasets with ABCD

- [R01MH119222-01](#) - Harmonizing multi-site diffusion MRI acquisitions for neuroscientific analysis across ages and brain disorders

### Animal models

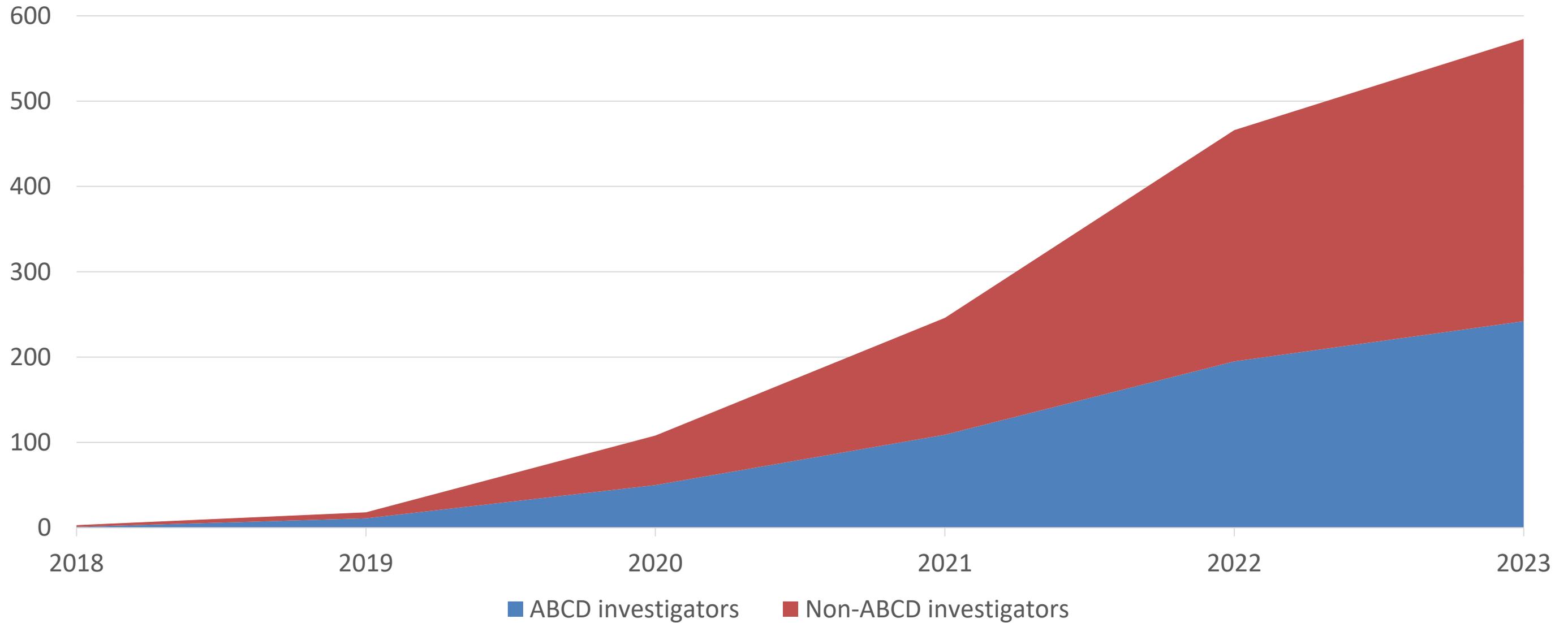
- [P50DA044118-01A1](#) - ICAL: Impact of Cannabinoids Across Lifespan (“behavioral tasks that parallel some of those tested in humans by ABCD, we also facilitate comparison of our results with analogous human outcomes”)

Methodology/Tools Development

Pooling Data with Other Datasets

Mechanistic Studies

# Publications Using ABCD Data



N=573

# Adverse Childhood Experiences and Alcohol in the ABCD Study

Adverse Childhood Experiences and Sipping Alcohol in U.S. Children: Findings  
from the Adolescent Brain Cognitive Development Study

Nagata JM et al. , *Preventive Medicine Reports*

Characterizing Alcohol Expectancies in the ABCD Study: Associations with  
Sociodemographic Factors, the Immediate Social Environment, and Genetic  
Propensities

Johnson et al., *Behavior Genetics*



# Adverse Childhood Experiences (ACEs) and alcohol in the ABCD Study

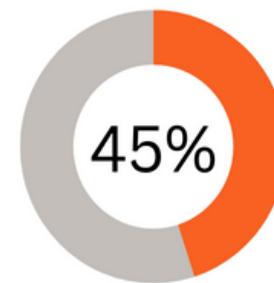
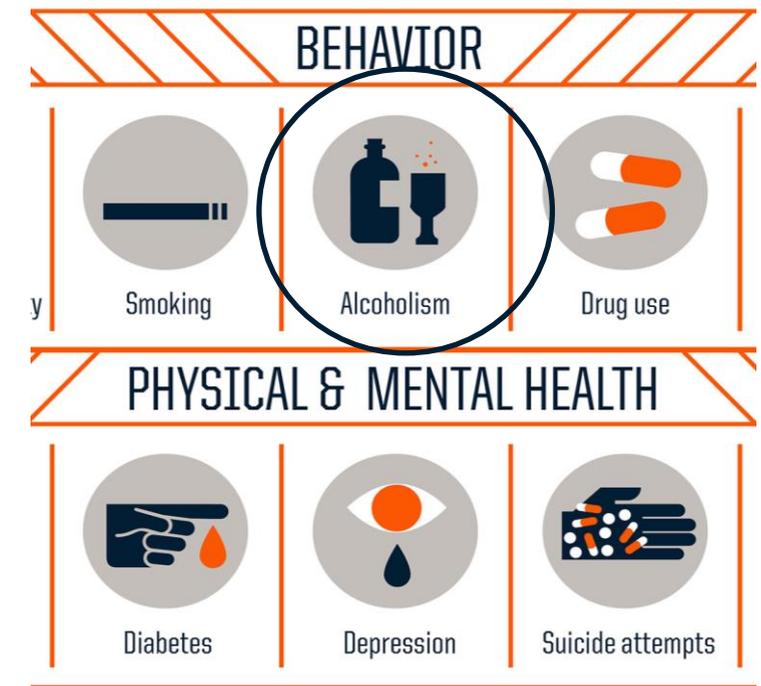
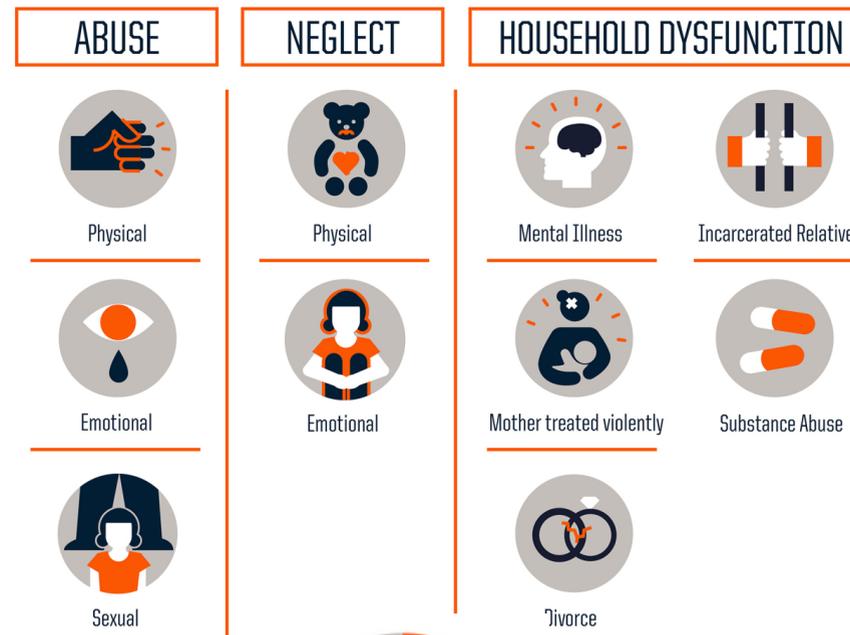


Alcohol Expectancies (AEs) – expectations of what consuming alcohol might do, does not require personal experience

Positive AEs have been associated with the initiation and early stages of alcohol use

Alcohol sipping may be useful predictor of future alcohol use and adverse outcomes

## Adverse Childhood Experiences (ACEs)



of American youth experience ACEs



# Methods and Descriptive Results

## Baseline – Ages 9-10

Johnson et al.

Alcohol naïve children

Examine associations between genetic propensities, sociodemographic factors, ACEs

Positive and Negative AEs

Nagata et al.

Some alcohol sipping

Examine the relationship between accumulating ACEs (0, 1, 2, 3, or 4+)

Alcohol Sipping



23%

## Prevalence in the ABCD Study families

### Adverse Childhood Experiences (ACEs)

ABUSE



Physical

NEGLECT

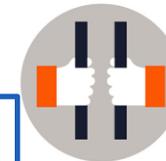


Physical

HOUSEHOLD DYSFUNCTION



Mental Illness



Incarcerated Relative

32%

15%

43% household violence



Emotional



Emotional



Mother treated violently



Substance Abuse

42%



Sexual

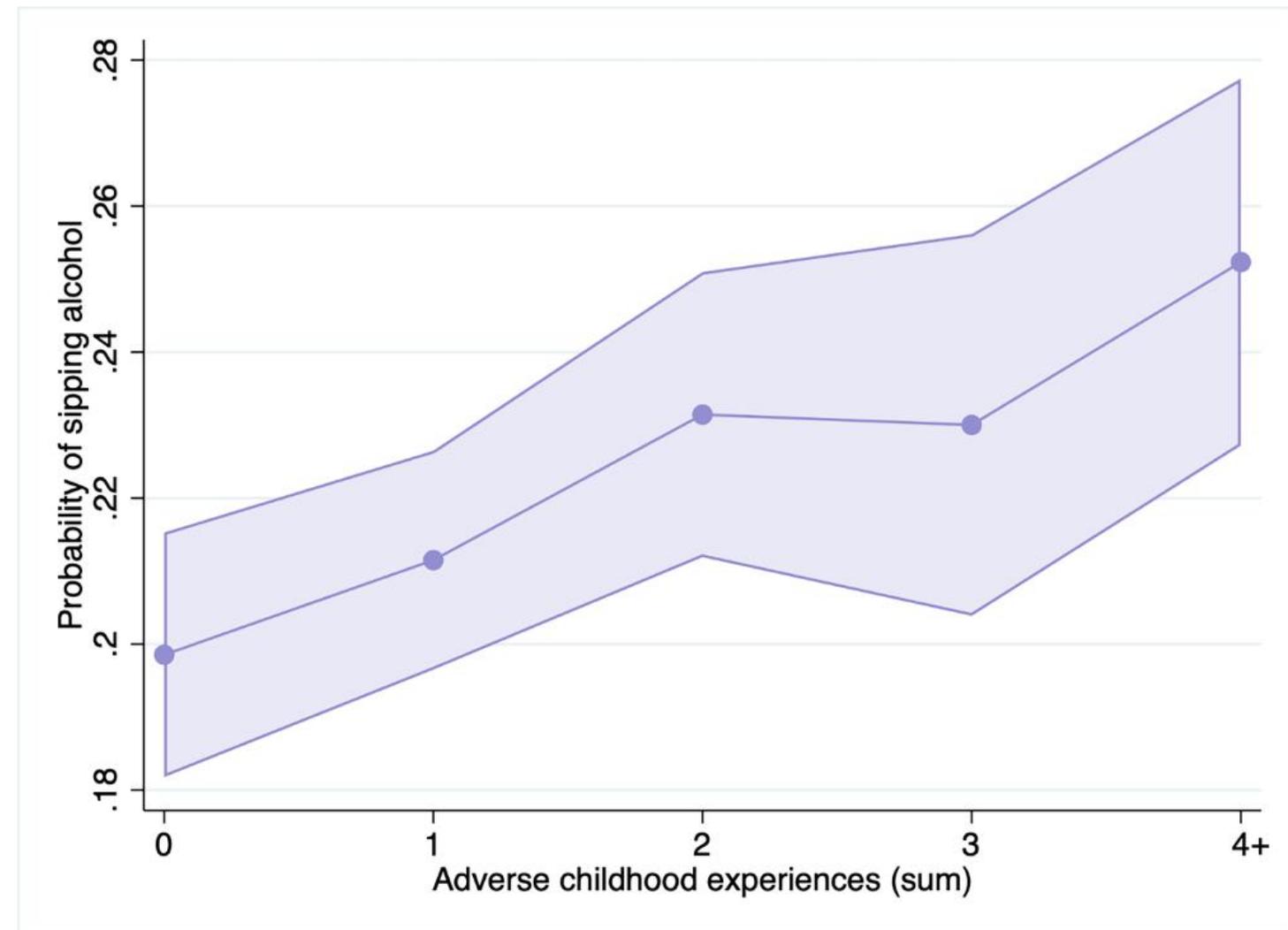


Divorce

16%

# Having 4 or more ACEs associated with increased risk of positive alcohol expectancies, sipping alcohol

- A larger number of ACEs was associated with greater likelihood of positive AEs (beta = 0.13, 95% confidence interval = [0.09 to 0.17],  $p = 3.0e-12$ ) in non-sipping youth.
- Having 4 or more ACEs was associated with 1.27 times the risk with sipping alcohol
- For ACEs subtypes, household violence and household alcohol abuse were significant



# Conclusions and Opportunities

- ACEs play a significant role in early alcohol behaviors
  - in alcohol-naïve youth, ACEs associated with positive AEs
  - accumulating ACEs associated with greater likelihood of alcohol sipping
- Longitudinal nature of ABCD – investigate future alcohol drinking in these participants
- ACEs, along with other sociodemographic and environmental variables, may inform predictive models for early prevention and intervention strategies



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    - **Racial Disparities in Adversity During Childhood and the False Appearance of Race-Related Differences in Brain Structure.**
- Research Dissemination

# Improving Justice, Equity, Diversity, & Inclusion (JEDI) in ABCD

## Dedicated FTEs

- Scientific Advisor for JEDI, NIDA
- Associate Director for JEDI, CC
- Administrative Support, CC

## External Consultant Report

- Reviewed report during annual meeting
- Using recommendations and roadmap to guide next steps, focused on:
  - Aligning on Values, Mission, and Vision
  - Improving the Culture
  - Developing a Diverse, Multicultural Organization
  - Improving Decision-Making and Communication
  - Creating an Accountability Structure

### AHE Suggested IDEA Roadmap

The following is a suggested roadmap of next steps in the equity journey. This tiered strategy starts with laying the foundation of commitment, vision, and capacity for an Equity Strategic Plan, moves to generating a concrete plan, and concludes with evaluation and sustainability. Should the ABCD need it, AHE is able to provide direct support for the activities listed.

#### LONG TERM

- Increase capacity and visibility of community engagement team
- Strategic relationship-building
- Opportunities for community engagement outside of research
- Increase involvement in community efforts

#### NEXT STEPS

- Creating a more inclusive culture for ABCD
- Bias Training
- Micro-behaviors Training
- Non-violent Communication Training
- Leadership Coaching (for those who require)
- Individualized mentoring
- Creating Feedback Loops
- Improving Communication
- Create and Practice Accountability Structure

#### IMMEDIATE ACTIONS

- Establish and Clarify Leadership Responsibilities
- Level set about Mission, Vision, Values
- Leadership team: Engage in Trainings to improve Cultural Competency and Generative Dialogue
- Internal communications/shared language
- Engage in visioning throughout ABCD
- Setting concrete recruiting and hiring goals
- Salary benchmarking
- Psychological Safety Interventions for targeted groups



# Improving JEDI in ABCD

## Reset

- Expanding efforts beyond racial discrimination
- Improving transparency and accountability

## Restructure

- Broadened Advisory Council membership

## Re-engage

- Quarterly JEDI All Hands
- Short trainings during Col/RA meetings
- More integration and collaboration with non-JEDI WGs

JEDI All Hands

Advisory Council

Equitable &  
Inclusive  
Methods WG

Diversity &  
Inclusion in  
ABCD WG

Responsible  
Use of ABCD  
Study Data WG

# START Program for Future Investigators from Historically Underrepresented Backgrounds

## Upcoming APA Session: *Impact of the Environment on Adolescent Development: Findings From BIPOC Scholars in the ABCD Study START Program*

Chair: Gaya Dowling, PhD

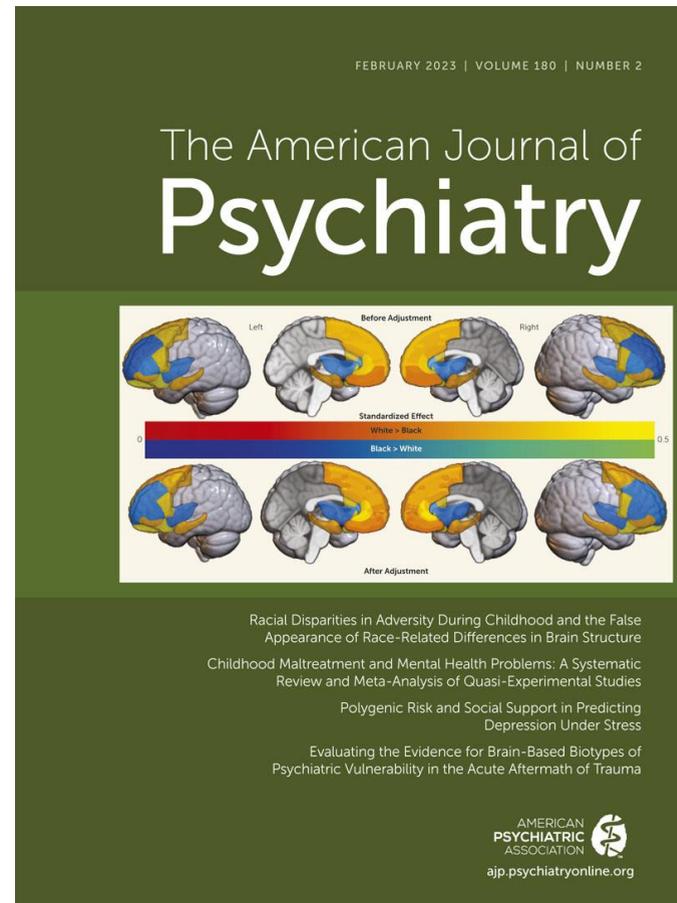
Discussant: Micah Johnson, PhD (University of South Florida)

- Neo Gebru, PhD (Brown University)
  - Relations among mental health conditions, familial environment, and facets of impulsivity in the ABCD study
- Skye Bristol (University of South Florida)
  - Family Conflict as a Risk Factor for Alcohol Expectancy Among Youth in the ABCD Study
- Stacy Ryan-Pettes, PhD (Baylor University)
  - Youth Externalizing Behavior Explained Through Parental Monitoring, Parental Inconsistent Discipline, Deviant Peer Affiliation, and Level of Neighborhood Risk: A Moderation Mediation Model



# Racial disparities in adversity during childhood and the false appearance of race-related differences in brain structure

Dumornay, et al. (2023) *American Journal of Psychiatry*



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# Racial disparities in adversity during childhood

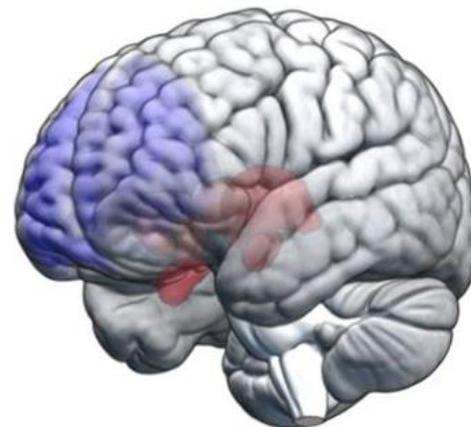
- ❑ Black youth in the United States are disproportionately burdened with adversity, including neighborhood disadvantage, material hardship and trauma
- ❑ Early adversity is associated with structural brain differences in regions involved in emotion regulation (amygdala, PFC, hippocampus; Calem et al. 2017; De Brito et al. 2013; Hanson et al. 2015)
- ❑ Previous work showed lower neural response to threat within these regions in Black compared to White young adults (Harnett et al. 2019)

United States	
White NH	19%
Black NH	33%
Asian NH	5%
Other NH	26%
Hispanic	21%

*ChildTrends* (2018)

Youth (<17yrs) across the U.S. with 2 or more ACEs

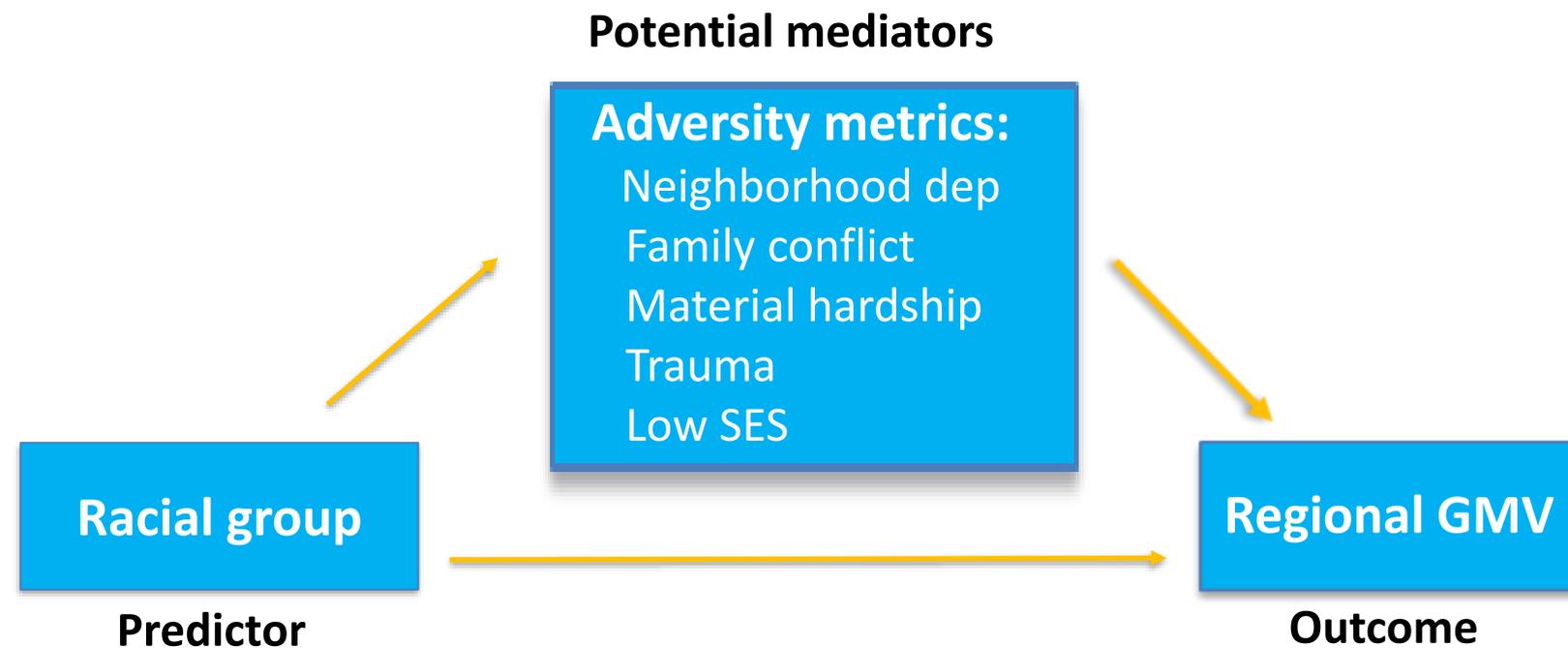
Min et al. (2022)  
*J Neurosci*



**Do early disparities in exposure to adversity contribute to youth race-related differences in brain volume?**

# Design & Analysis

- ❑ N = ~7,500 White youth, ~1,800 Black youth at ABCD baseline visit (age 9-10)
- ❑ Assessed group differences in exposure to adversity
- ❑ Ran mixed-effects models to assess race-related differences in gray matter volume – each model included all indices of adversity with brain region as dv
- ❑ Investigated whether accounting for childhood adversity attenuated race-related differences in regional grey matter volumes



# Racial disparities in adversity contribute to race-related differences in grey matter volume

Adversity metric*	White	Black
Neighborhood disadvantage	90.3	105.9
Family conflict	1.96	2.43
Material hardship	0.3	1.01
Trauma history	0.48	0.67

\* Mean sum scores

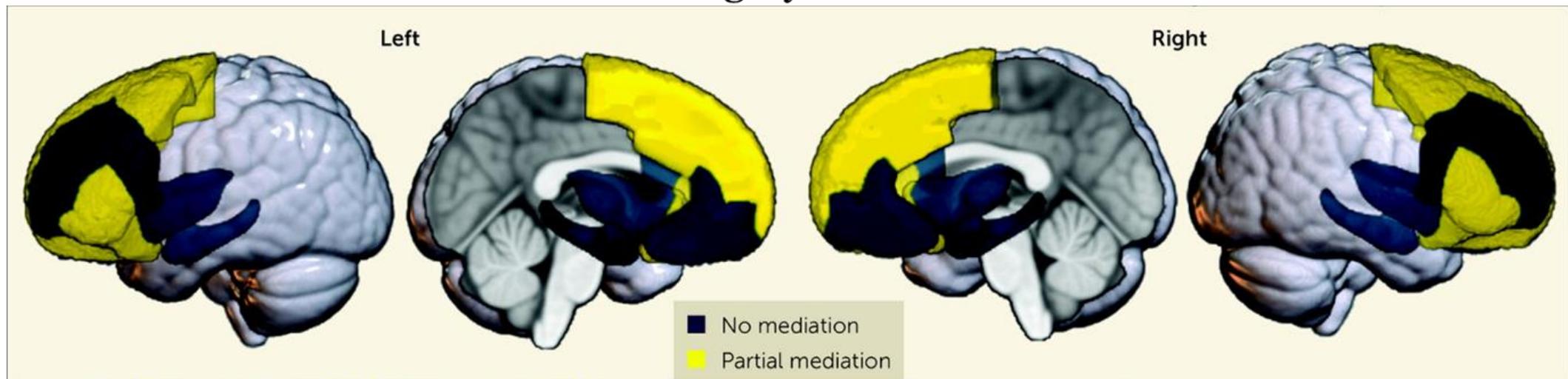
Caregivers of Black youth also had lower educational attainment, lower income, and more unemployment compared with those of White youth

- Black youth had lower brain volume (amygdala, hippocampus, PFC) compared with White youth
- Brain volume differences varied with adversity metrics with family income most frequent predictor; **disparities in adversity exposure partially mediated some of these differences**

# Disparities in childhood adversity contributed to race-related differences in brain volume in key regions associated with threat-related processes

Accounting for adversity exposure partially mediated race-related differences in grey matter volume

- Ant. cingulate
- Middle frontal
- Orbitofrontal
- Inf. frontal
- Sup. frontal
- Frontal pole



Additional sociodemographic variables available in ABCD but not included in these analyses:

- Perceived discrimination
- School context
- Census-based measures of systemic inequities

The findings begin to “elucidate and correct the long history of reporting of differences in health, behavioral, and neural outcomes attributed to race and/or ethnicity”

-- Barch & Luby, 2023 *Am J Psych*

**New study reveals  
the effect of racism  
and poverty on  
children's brains**

Feb 18, 2023 5:40 PM EST

**PBS**  
**NEWS**  
**WEEKEND**

**Differences in Brain Structure Linked to Social  
Disadvantage**

**Medscape** Sunday, February 26, 2023

HEALTH

**MRI scans reveal disparate impact of  
poverty and other 'toxic stress' on brains  
of Black children** STAT

## Questions and challenges:

- How might brain volume differences between groups change across development?
- Racial disparities in adversity only partially mediated race-related differences in GMV but the authors excluded many other constructs available in ABCD ,“leaving the reader with the potential impression that race continues to account for brain volume even after considering social factors”
- **Should we avoid framing this kind of work in the context of race differences in brain or behavior and instead focus directly on SDOH “while simultaneously recognizing that Black youths in our country and many others face a greater burden of SDOH”?**



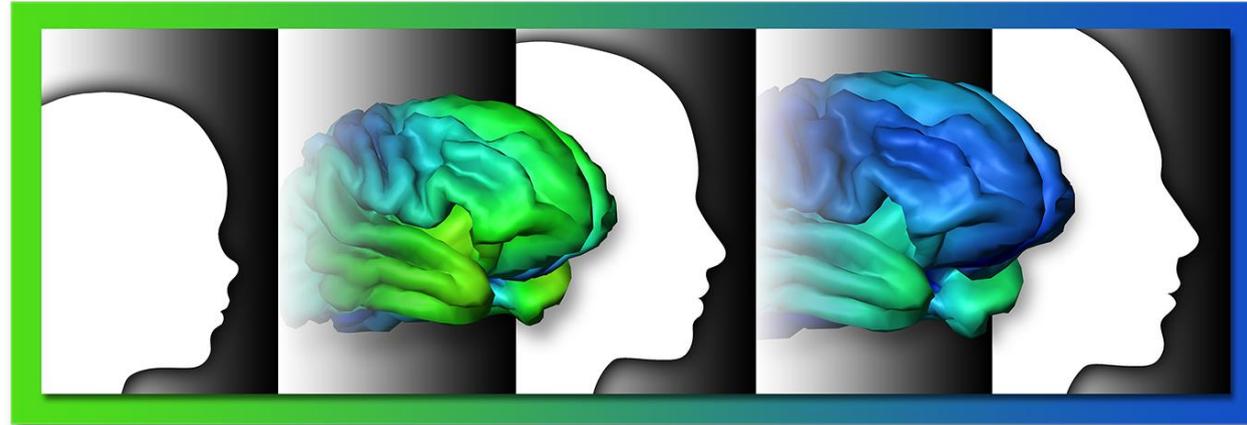
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    - Screentime infographic and webinar



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ABCD Research  
Questions

Methodology/Tools  
Development

Additional Research  
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Pooling Data with  
Other Datasets

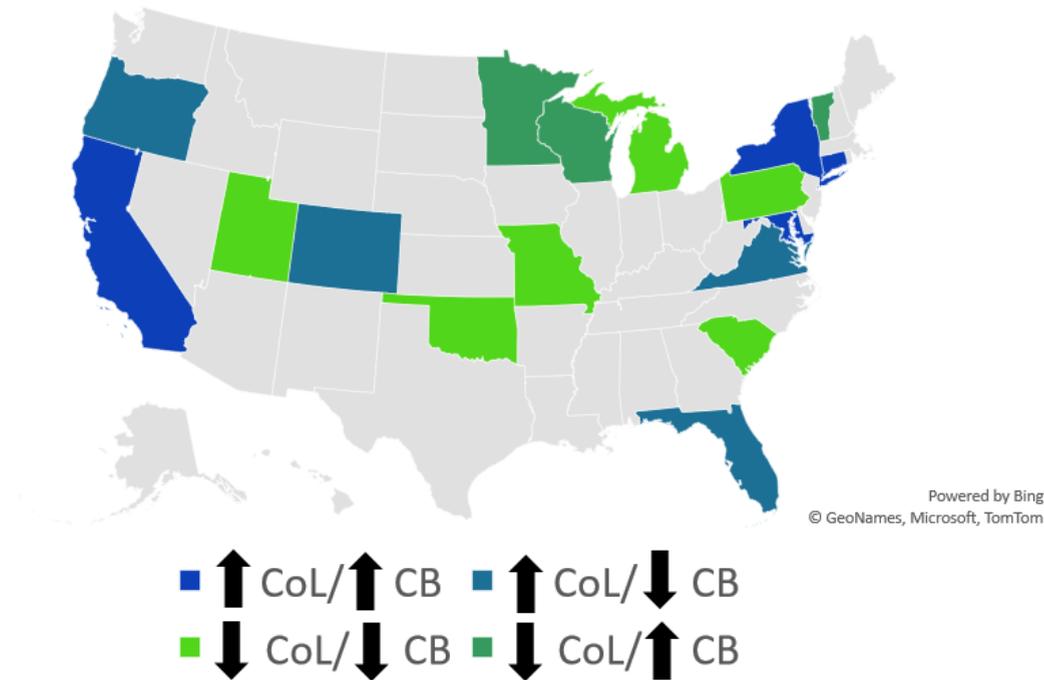
Mechanistic Studies

Diagnostic/  
Intervention  
Development

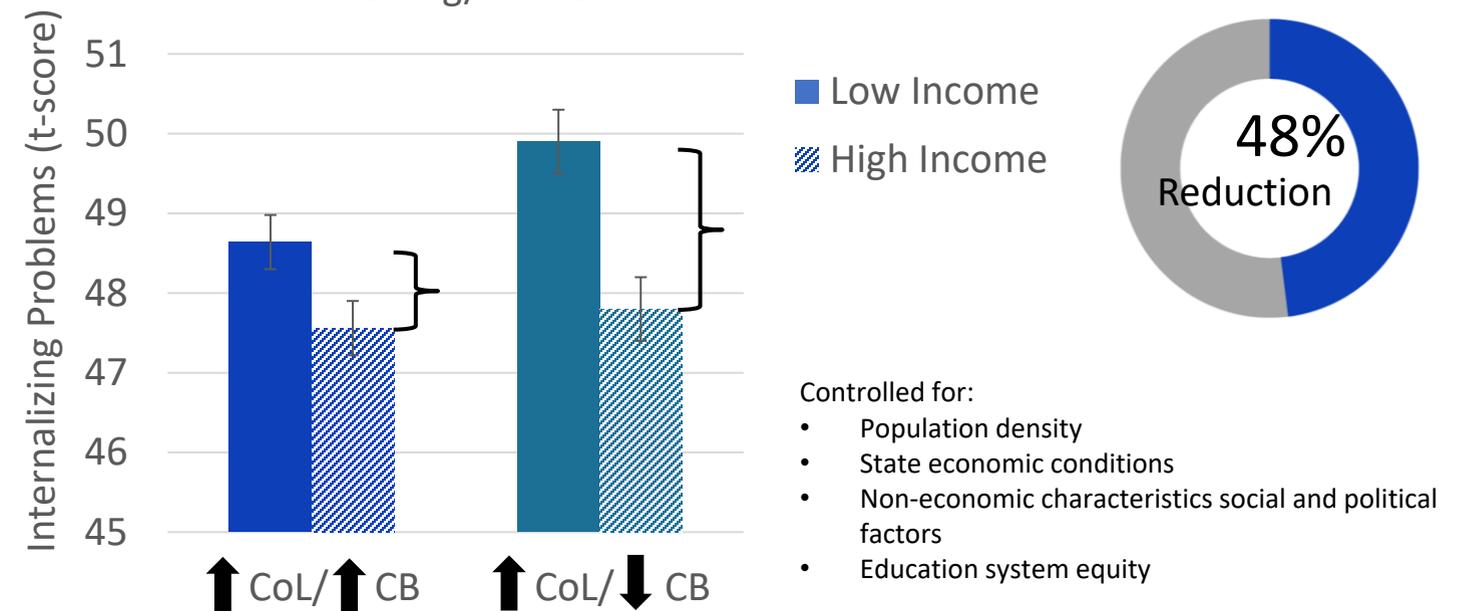
Policies/Practices

# Antipoverty Programs Associated with Reduced Disparities in Brain Development and Mental Health

Cost of Living (CoL), Average Cash Benefit(CB) by State



Internalizing Problems by Income/Cost of Living/Cash Benefit



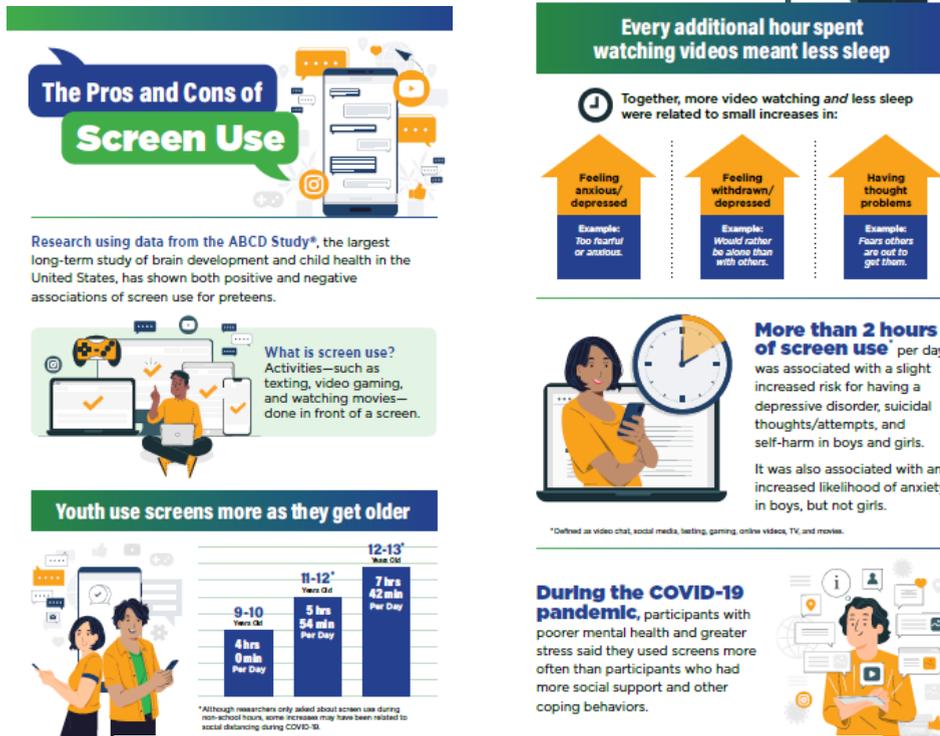
In less than one week, **337 news stories** published had the potential to reach over **776.6 million people**



# Research Dissemination



## Infographics



! These studies showed that time spent on screens was associated with a lot of things, good and bad, at the time data were collected. They didn't show that one thing caused the other. Many things could have affected these findings, which may also change over time. Researchers continue to explore these questions.

- Sent to all ABCD families and advisory groups.
- The Vista Unified School District distributed this information to over 25,000 members of their community in their [Digital Citizenship project](#).
- The school superintendents' association shared with their 30,000 members.

## Webinars

**The Pros and Cons of Adolescent Screen Use**

Join scientists working with data from the ABCD Study to understand youth screen use and the relationship to health and behavior.

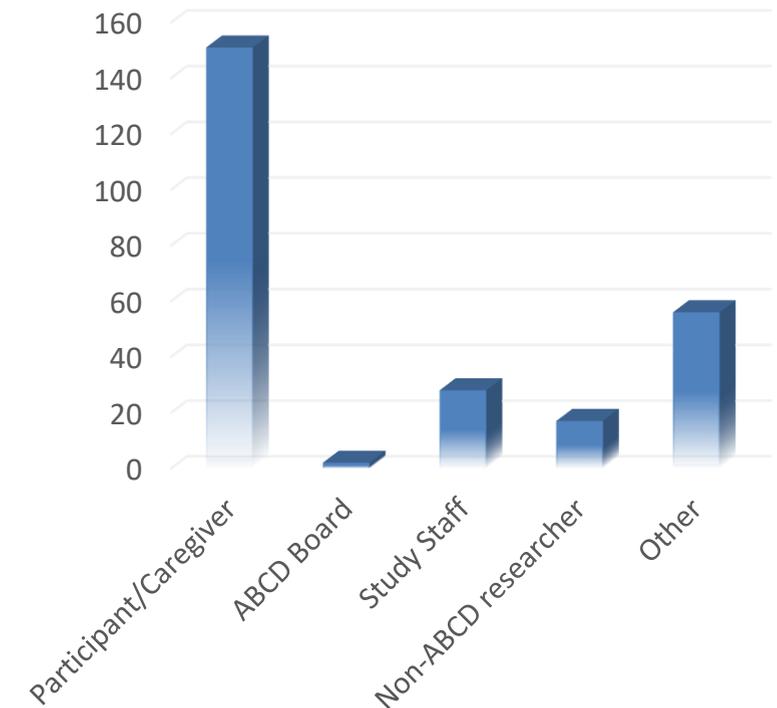
**Findings from the ABCD Study®**

**Thursday, May 4, 2023**  
6:00-7:30 p.m. ET (3:00-4:30 p.m. PT)

### Agenda

- Dr. Jason Nagata, *Trends in Screen Use in the ABCD Study*
- Dr. Bader Charani, *Different levels of videogaming in children are associated with different cognitive outcomes*
- Dr. Orsolya Kiss, *Screentime and sleep in adolescents before and across the first year of the COVID-19 pandemic*
- Discussion and Q&A

### WEBINAR ATTENDEES\* N=254



\*Not including federal/webinar staff

# Thank you to...

- 10 Federal partner agencies and their staff
- 21 research sites, coordinating center, data analysis informatics and resource center
- Hundreds of investigators and trainees
- **Even more research assistants and staff**
- **And nearly 12,000 participants and their families**





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For More Information, Please Visit:

[ABCDStudy.org](http://ABCDStudy.org)